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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/627,000

07/25/2003

Fu Shiung Hsu

MXIC-P910351

3701

7590

07/20/2005

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EXAMINER

SCHILLINGER, LAURA M

ART UNIT

PAPER NUMBER

2813

DATE MAILED: 07/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/627,000

Applicant(s)

HSU ET AL.

Examiner

Laura M. Schillinger

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 May 2005.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 5-12 are rejected under 35 U.S.C. 102(e) as being anticipated by Kobayashi et al ('566).

Kobayashi et al teaches the following claimed limitations as cited below:

1. A method for forming at least one non-volatile memory cell, comprising:

forming a first oxide layer (202), an electron trapping layer (206- Col.8, lines: 45-60), a second oxide layer (208), a first electrically conductive layer (209), and a dielectric layer on a surface of a substrate (210) in that order (Fig.5(a-e));

patterning the dielectric layer and the first electrically conductive layer, thereby forming at least one component stack (Col.9, lines: 40-55);

depositing a third oxide layer over and beside the at least one component stack (Fig.11 (214') and Col.13, lines: 33-40) ;

removing a portion of an upper section of the third oxide layer opposite the second oxide layer such that an upper portion of the dielectric layer is exposed through the third oxide layer (Col.13, lines: 33-40);

removing the dielectric layer and a remaining portion of the upper section of the third oxide layer such that an elevation of an upper surface of the third oxide layer above the surface of the substrate is substantially equal to an elevation of an upper surface of the patterned first electrically conductive layer (Col.13, lines: 40-42 and Fig.10 (b))); and forming a second electrically conductive layer over upper surfaces of the patterned first electrically conductive layer and the third oxide layer (Fig.21(a) (311a)).

5. The method as recited in claim 1, wherein the removing of a portion of an upper section of the third oxide layer comprises dipping the portion of the upper section in an etchant solution (CMP includes a slurry which is an etchant solution (Col.13, lines: 35-40)).

6. The method as recited in claim 1, wherein the electron trapping layer comprises silicon nitride (Col.8, lines: 45-50).

7. The method as recited in claim 1, wherein the first electrically conductive layer comprises doped polysilicon (Col.9, lines: 25-35).

8. The method as recited in claim 1, wherein the dielectric layer comprises silicon nitride (Col.9, lines: 35-40).

9. The method as recited in claim 1, wherein the second electrically conductive layer comprises doped polysilicon (Col.18, lines: 20-25).

10. The method as recited in claim 1, wherein: the patterning further comprises patterning the second oxide layer, the electron trapping layer, and the first oxide layer, to thereby form the at least one component stack; and the depositing of a third oxide layer over and beside the at least one component stack is preceded by forming an oxide layer beside the component stack (Col. 13, lines: 35-40).

11. A semiconductor structure formed using the method set forth in claim 10 (rejected with claim 10).

12. A semiconductor structure formed using the method set forth in claim 1 (rejected with claim 1).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi et al ('566) as applied to claim 1 above, and further in view of Tsui et al ('030).

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In reference to claim 2, Kobayashi teaches method as recited in claim 1, and teaches wherein the third oxide film is formed of TEOS or SOG, however fails to teach the limitation of claim 2, wherein the depositing of a third oxide layer comprises depositing a third oxide layer over and beside the component stack via a high density plasma chemical vapor deposition (HDP CVD) process.

Kobayashi fails to teach the limitation of claim 3, wherein the depositing of a third oxide layer is carried out at a temperature lower than a temperature required to thermally grow the third oxide layer.

Kobayashi fails to teach the limitation of claim 4, wherein the depositing of a third oxide layer is carried out such that the third oxide layer has a thickness between about 1200 Angstroms and approximately 1400 Angstroms.

However, Tsui et al teaches that wherein the depositing of a third oxide layer comprises depositing a third oxide layer over and beside the component stack via a high density plasma chemical vapor deposition (HDP CVD) process as recited in claim 2 (Col.4-5, lines: 65-10).

Tsui teaches wherein the depositing of a third oxide layer is carried out at a temperature lower than a temperature required to thermally grow the third oxide layer (low temperature- Col.4-5, lines: 65-10) as recited in claim 3.

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Lastly, Tsui teaches the limitation of claim 4, wherein the depositing of a third oxide layer is carried out such that the third oxide layer has a thickness between about 1200 Angstroms and approximately 1400 Angstroms (Col.4-5, lines: 65-10).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kobayashi's TEOS or SOG oxide film to further include the deposition method, temperature and thickness described by Tsui because as Tsui teaches, such methods are appropriate to deposit an oxide film from TEOS or SOG (Col.4-5, lines: 65-10).

13. A semiconductor structure formed using the method set forth in claim 3 (rejected with claim 3).

Response to Arguments

Applicant's arguments filed 5/9/05 have been fully considered but they are not persuasive. Applicant argues that Kobayashi fails to teach a first oxide film- however such an argument is not persuasive, see layer 202. Applicant further argues that layer 206 cannot trap electrons; however this argument is also not persuasive; see Col.8, lines: 45-60.

Conclusion

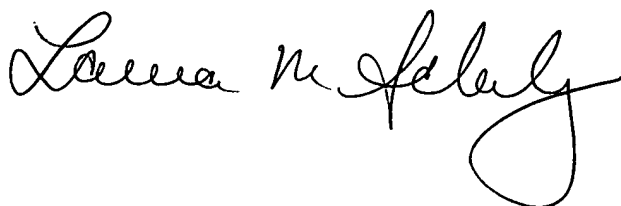
THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Laura M. Schillinger whose telephone number is (571) 272-1697. The examiner can normally be reached on M-T, R-F 7:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W. Whitehead, Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Laura M Schillinger

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Primary Examiner
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07/15/05